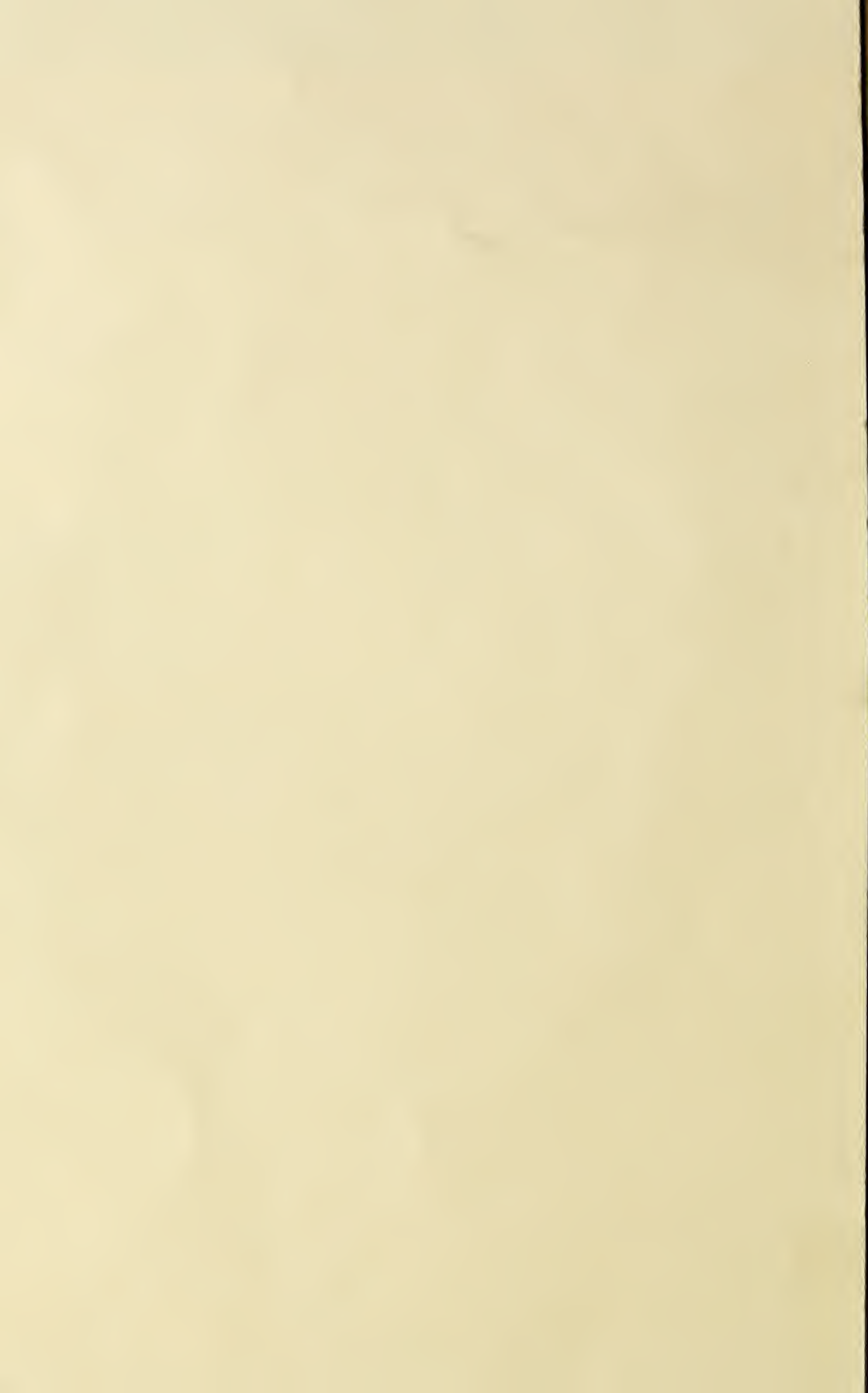


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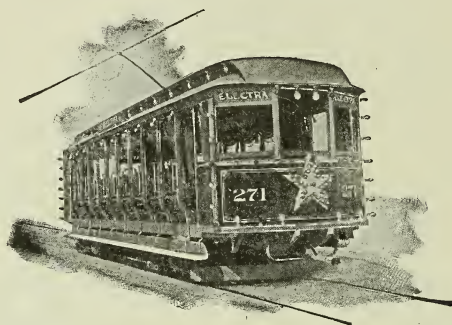
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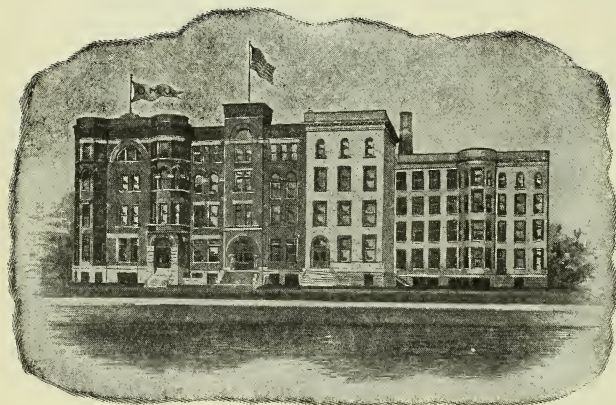
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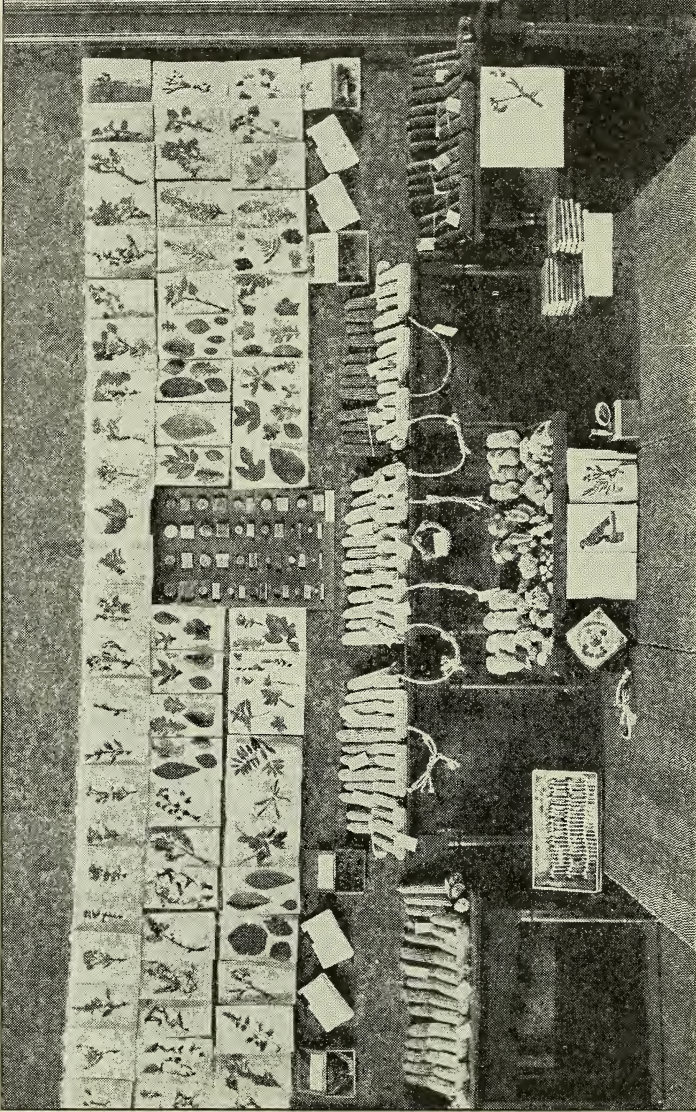
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Rural School Agricultural Exhibit at Farmer's Institute, Springfield Tp., Clarke County, Ohio.

THE AGRICULTURAL STUDENT.

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OHIO STATE UNIVERSITY, COLUMBUS, APRIL, 1905

No. 7

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EDITORIAL CHAT.

The growing interest which practical farmers and live stock men of Ohio are taking in the College of Agriculture is indicated by the many valuable gifts which have recently been made the institution. J. McClain Smith, a director of the university and secretary of the Red Polled Cattle Club, presented six head of registered Red Poll cows and heifers, one of which was imported. Mr. J. A. Gerlaugh, of Harshman, O., one of the leading breeders of Shorthorn cattle in the state, gave the university two select pure bred white Shorthorn steers. O. A. Estle, of Springfield, recently donated a pure bred Angus steer calf, ten months old. D. E. Williams, of Columbus, who owns a large farm near Hebron, Ohio, gave to the college a grade Hereford steer calf. The latest contribution is that of Mr. James Buckingham, of Zanesville. It consists of several hundred bound volumes of books, some of which are of great value. Among them, the English Sporting Magazine, 1821-1838, 30 volumes; American Turf Register, 1830-1860, complete; Turf, Field and Farm, 30 volumes, complete, 1865-1892; Spirit of the Times, 9 volumes; Wallace's Horse



Monthly, first 19 volumes; American Stud Book, by Bruce, 4 volumes; Whye's History of the British Turf, 1840; Darville on the English Race Horse, 1846; Wallace's Year Book, 4 volumes; The Horse of America, by Forrester; The Wool Grower, 8 volumes; and the Country Gentleman, 68 volumes.

Some of the agricultural papers have recently been publishing compilations of statistics showing that there has been a marked shortage in this country's corn supply since 1900. Prices have without exception been abnormally high during all this period and especially so in 1902, while the demand for corn from feed lots, factories and foreign consumers has been most constant and active. Yet in 1903 producers planted six million acres less corn than in 1902, three million less than in 1901 and in 1904 they planted over two million less than in 1902.

Iowa seems to be the only state that is awake to the situation. The final figures of the Iowa corn crop for 1904 show an aggregate yield of 323,853,330 bushels, surpassing the yield of 1903 by 93,000,000 bushels and the average of the past fifteen years by 60,000,000 bushels. Some interesting figures on this crop are given by F. G. Moorhead. He says: "If it were desired to transport this corn crop across the continent 20,000 locomotives would be required. So long would be the trains drawn by these locomotives that, as the engine of the first was whistling for San Francisco ferry the lights on the caboose of the last would be just flashing past the station at Bangor, Maine."

The market price of Iowa's crop at present prices is near \$120,000,000. With such crops as this in the State of Iowa the great shortage in the country's

crop for the past few years can hardly be explained, unless it is that the farmers of the remaining corn states of the country do not realize the enormous increase during the last few years in the quantity of corn required for the manufacture of various corn products, nor the wonderful growth of the export trade in corn up to 1902, when the high price paid for corn for home consumption reduced it to 26,-636,000 bushels for that year, from 208,-745,000 bushels in 1898; 174,089,000 bushels in 1899; 209,348,000 bushels in 1900, and 177,818,000 bushels in 1901. The commercial corn products, referred to above, are turned out daily, literally by the train loads, from numerous great factories scattered all over the country, in our various manufacturing centers. While the immense and growing demands made by them upon the corn supply is one of the strongest sustaining factors of the corn market.

With such a large and varied demand farmers need not fear to plant all the corn they can cultivate well, at the same time striving to produce the largest possible yield from the acreage planted. It is not likely that corn will ever descend in value to the low levels of the past, and at least not in the near future. The corn cultivating area is limited and can never be widely extended, because of the requirements made by the crop upon soil, moisture and climate, while there is no limit to the growth of population, to the possibilities of export trade in corn and meat products or to the growing demands for corn by manufacturers of corn products.

"Feats of great men all remind us
We can make our own feet climb;
And, departing, leave behind us
Footprints that are six by nine."

—EX.

A SUGGESTION.

ALFRED VIVIAN.

A number of our readers will feel disappointed that the usual article by Mr. A. B. Graham on the teaching of agriculture in the rural schools does not appear this month. Sickness in the family has made it impossible for Mr. Graham to prepare a paper for this issue but a contribution from him will appear as usual next month.

the rural school agricultural clubs at a farmers' institute held at Springfield, and is full of suggestions of what this work may be made to do for the children of the rural districts.

If I am not mistaken the photograph indicates also the reason for the remarkable success that has attended Mr. Graham's efforts in this work. I take it that



A Friday afternoon exercise in identifying plants and insects and testing soils.

This series by Mr. Graham is being followed with considerable interest by a number of teachers in this state, for the majority of educators realize that the subject is a live one, and the success of the attempt in Springfield township has attracted widespread attention.

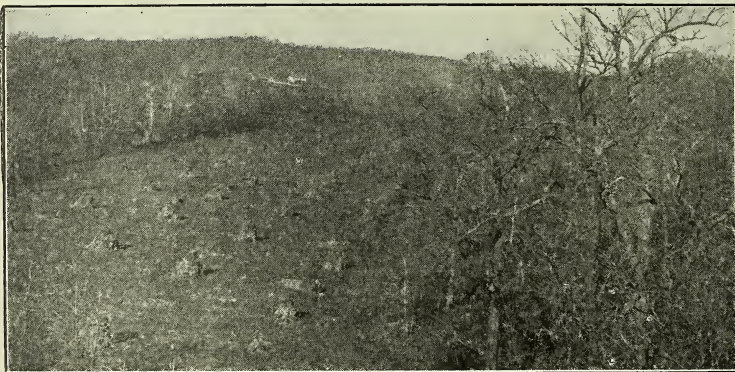
The frontispiece of this issue represents an exhibit made by the children of

he is an exponent of the idea that the best way to learn to do a thing is by doing it; and it appears to the writer that this idea must be pretty firmly fixed in the mind of the teacher before he can expect to attain to any considerable success in teaching agriculture in the rural schools. I am inclined to regret that so many so-called text-books for use in

teaching elementary agriculture have already appeared, and I anticipate with dread the host of such books that are sure to follow. I do not mean by this statement that there is no place for books in elementary agriculture, but I sincerely hope that the teaching of agriculture in the rural schools will never develop to any large extent into a system of text-book instruction. The beauty and value of this work in the rural schools lies in the fact that it presents a means of interesting the pupil in his surroundings, and in impressing upon his mind that there is a vast amount of useful knowledge which can be obtained outside of books. It will be a great deal easier for the teacher to assign a lesson in a text-book than to give such instruction as is necessary to a successful course in nature study, especially if the teacher himself is poorly prepared for the work; and it is the fear that the less energetic instructor will come to rely entirely upon these text-books that makes me view their advent with some apprehension. It is very doubtful in my mind if there is any place in the district school for such a systematic course in agriculture as is contemplated in the text-books on rural school agriculture, most of which, by the way, are evidently written by persons little acquainted with the

limitations of the district school student, to say nothing of the average teacher in the rural schools. Personally, I do not desire to have the teacher in the district school undertake to present any large number of facts of practical agricultural importance, but what I do desire is to have the attention of every farm-reared child called to the beauties and wonders that surround him in his everyday life. I want him to know that his father's occupation is as honorable and noble as any of the professions, and that it affords as large a field for dignified study. By all means let him know that master minds among the writers have found the subject of agriculture worthy of their efforts, and that they have produced a wonderfully rich literature, but above all let him learn to study in the field, by the roadside, and among the animals and insects of the farm. Cultivate his observation, that faculty which is so neglected in our present day methods of teaching.

These objects it seems to me are more likely to be gained through the rural school agricultural club, as used by Mr. Graham, than by any text-book course of study. When the student enters high school will be soon enough to introduce him to a systematic study of agriculture, but more on that subject anon.



ABSTRACTS OF ARTICLES OF ESPECIAL IMPORTANCE TO THE AGRICULTURAL WORLD.

FARM MACHINERY AS A FACTOR IN AMERICAN AGRICULTURE.

By C. J. Zinthes, B. Sc.,

Professor Farm Mechanics, Iowa State
College, Ames, Iowa.

Farm machinery has made it possible to develop the vast agricultural resources of the country. During the first two hundred years after the Pilgrim fathers settled on the American shore the resources of the country failed to bring about any increase of importance in commerce or in the products of agriculture. As late as 1845 the people did not raise enough wheat for their bread. With the advent of the steel plow, the self-binding harvester, and the steam threshing machine, there was a marked change in the producing power of the American people. Our food supply increased from 4.33 bushels of wheat per person in 1845 to 5.50 bushels in 1859; to 7.45 bushels in 1869, and as high as 10 bushels in 1889. During the same time the population on the farms had decreased to 80% in 1850 and to 33% in 1900. The American farmers of today with one-third the labor of the country produce enough food to support not only themselves, but the other 67% that live in the cities, and exported farm products during the year 1904 to the value of the enormous sum of \$960,000,000, according to the United States Secretary of Agriculture's report. This same report states that in 1830 it took over three hours labor to raise one bushel of wheat; in 1896 it took ten minutes. In 1830 the labor in one bushel of wheat cost $17\frac{3}{4}$ cents; in 1896 it cost three and one-half cents. In 1850 the labor represented in a bushel of corn was

four and one-half hours, while in 1894 it had been reduced to 41 minutes. (This has been greatly reduced since then by the introduction of the more modern corn-harvesting machines.) In 1860 it is estimated that the labor in one ton of hay in bales represented $35\frac{1}{2}$ hours, while in 1894 this labor was reduced to $11\frac{1}{2}$ hours, or from a cost of \$3 in labor to \$1.29 in labor.

The report estimates that in the year 1890 the agricultural implements in the United States saved in human labor the sum of \$681,471,827. This country is the greatest maker and user of agricultural implements in the world and this is largely due to the fact that this country is the most prosperous agricultural country in the world. It has enabled the farmer to pay the high price for labor caused by the competition of our manufacturers, and has taken away from farm life much of the drudgery and manual labor and made it in the best sense an intellectual pursuit. Improvements in machinery have brought about a steady decrease in the cost of production, notwithstanding the steady rise in wages. To give an idea of the vast sums of money invested in farm machinery, take for instance the following states: Iowa has \$57,960,000 invested; New York, \$56,006,000; Pennsylvania, \$50,917,240; Illinois, \$44,977,310; and Ohio \$36,354,450. The total value of implements on farms in this country is \$761,261,000, an average of \$133 per farm, and 90 cents per acre of farm land. The American farmers buy annually \$100,000,000 of farm implements. New designs of farm machinery are being constantly added so

that farm machinery is surely the greatest factor in the development of American agriculture.

AGRICULTURAL ENGINEERING IN THE UNITED STATES.

By Elwood Mead,
Chief of Irrigation and Drainage Investigations.

Agricultural engineers have hitherto had little opportunity for practicing their profession in the United States. The large areas of cheap land and crude and wasteful methods of cultivation preventing any large expenditures on engineering works for the improvement or reclamation of agricultural areas.

These conditions are now rapidly changing. The building of canals and dams to irrigate the arid lands of the West; the construction of dikes and drains, and the installation of pumps to remove the surplus water from our swamp and overflowed lands are two of a number of lines of work which are opening up broad fields of usefulness and power to specially-trained young men. Our agricultural colleges are recognizing this and beginning to provide adequate courses of instruction. Within the past year the Iowa State College has completed a commodious building, with a complete equipment for instruction in this branch of engineering. Wisconsin is erecting a building; Illinois, Minnesota, Nebraska, and Wyoming have courses in agricultural engineering; while Colorado and California make irrigation engineering one feature of their courses in civil engineering. Special training in the administration of canals and in the laws and customs governing the use of streams are required by the irrigation engineer. This is being provided by the agricultural colleges and by the reports of the irrigation and drainage investigations of the Office of Experi-

ment Stations, U. S. Department of Agriculture.

Drainage engineering is becoming an important factor in agricultural production. The reclamation of the swamp and overflowed lands along our sea and gulf coasts will add 100,000,000 acres to the productive area. Tile underdrains are being made use of to protect hillside farms from erosion.

Modern farm machinery includes motors run by steam, gasoline, electricity, and wind. Where farmers do not understand their care and management there is great waste and loss. Although this country is the greatest maker and user of farm machinery in the world the agricultural schools of the United States are far behind those of Europe in the training given on this subject.

IRRIGATION AND DRAINAGE INVESTIGATIONS.

By C. S. Elliott,
Expert in Drainage, U. S. Department of Agriculture, Washington, D. C.

Chemical analysis may show two soils equally rich in plant food but radically different in production. Subsequent culture experiments show that the cause of this difference is the unfavorable water conditions found in the unproductive soil. The varying production of different portions of the same field may often be wholly accounted for by the difference found in the water content of the soil, which element is known to exercise an important function in the quantity and quality of plant production. The supply of water and the control and regulation of its quantity in soils of different classes under varying climatic conditions for the production of crops of diverse character present an important field which now occupies the attention of the Irrigation and Drainage Investigations. The ob-

jects of this work are to ascertain the best methods and promote their use in applying water to soils where it is deficient, conserving and regulating lands from overflow, all of which involve a variety of engineering practice differing in many respects from that required in other divisions of the profession.

Soil water which is necessary to the germination and growth of plants is held about soil grains in films and is removed from the soil by capillarity, plant absorption and surface evaporation only. Irrigation must supply this amount where deficient, and if more than is required is supplied, the surplus must be removed by drainage. The water-holding capacities of different soils in this

connection are important subjects for investigation.

The part of the engineer is to provide means for supplying, regulating, and controlling soil water and adjusting the works of irrigation and drainage to meet the needs of the various kinds of soils encountered, always taking into account the plants to be grown upon them. Investigations of this character relate to movements of water by capillarity as well as by gravity, the quantity held by surface tension as well as that which is free to move through the soil by gravity, and the means of removing the surplus, as well as supplying needed water in soils where it is found deficient for producing the highest plant development.

A QUESTION OF FENCE POSTS.

E. R. MINNS.

How many of those pioneers who entered the Northwest Territory more than a century ago, thought anything about a possible scarcity of timber in this region where once stood such magnificent forests of deciduous trees? Or how many of our grandfathers; as they split their fence rails from black walnut and hickory logs, paused to ask themselves what young farmers were going to build fences of fifty years hence?

The old rail fences of Ohio are rapidly disappearing before the elements, and it is well that they should. In their places we are building fences which do not harbor weeds nor take such margins from our cultivated fields. But the modern wire fence will not stand alone, and how and where to get the required posts to which to fasten it is becoming a really serious question in many sections of Ohio.

Few of our native trees have the requisite durability of good fence posts. Some which are durable enough are of such slow growth that the supply is quite lim-

ited. No other use to which timber is placed requires such lasting qualities as exposure to moist earth. Perhaps we shall solve the question in due time by the use of steel and iron posts, but as yet these are in the experimental stage and too costly for ordinary use.

That there is an urgent need of post and pole material is evidenced by the shipment of cedar posts from Michigan into Ohio. In some places farmers are making use of defective railroad ties which the railroad companies have taken from their roadbeds. In others they are using the softer and less durable timber because no other is to be easily obtained.

The writer was brought up on a farm where fifty years ago many rods of osage orange hedge were planted. This kind of fence was expected to do away with any need for posts, and if allowed to grow without cutting would furnish posts for such places as were required elsewhere on the farm. These advantages were more than offset by the

unsightliness of the fence, its capacity for harboring weeds and robbing crops of moisture for several yards on each side. For the farmer who had time to trim his hedgerows when they needed it, these disadvantages did not appear so strongly, but on the farm cited, the hedgerows were voted a nuisance and by dint of much hard labor they were slowly eradicated. There remained one stretch of several rods which was allowed to grow for posts, as it did not stand near the public highway and the owner thought that the future needs of the farm for post material would warrant the inconvenience from allowing this hedgerow to stand. Now at the age of fifty years it is being cut for posts as required. Some of the plants have attained such growth that as many as four or five seven-foot posts may be cut from the best. Some have reached a diameter of nearly one foot at the base, while others are less than six inches. It might be safe to say that this hedge row cuts twenty posts to the rod. There is no more lasting post material than this same osage orange tree when properly seasoned. In fact it is too hard to drive an ordinary fence staple into conveniently.

But who would think now of waiting fifty years for his fence posts to grow? Some quicker way to meet the needs was sought several years ago. Plantations have been established by a few persons in Ohio with the intention of growing posts and poles. The yellow or black locust, which is indigenous to our state, was planted in a few cases. It is well known that its timber is durable and that the tree makes a fairly rapid growth, but too often the body of the tree is found, when cut, to be honeycombed by borers, and its usefulness much impaired.

Some plantations were set supposedly to *Catalpa speciosa*, a western tree and known to be very durable and a rapid

grower. In many cases the grower has discovered after several years of waiting that a spurious species of *catalpa* had been sold to him for the *speciosa* and the plantation is a disappointment. Other plantations have been set with the idea of approximating forest conditions, so the trees were planted closely together, cultivated little or none and left to struggle with each other for supremacy. Such plantations whose owners failed to see their mistakes in time to thin out the trees to some purpose, are good object lessons on how not to plant *catalpa* trees.

The writer visited one such plantation located on the farm of Mr. John Aldrich, at Worthington, Franklin county. A portion of the plantation was set to *C. speciosa*, the balance to a hybrid *catalpa* which has not proven so desirable for post material as the *speciosa*. The trees were planted in rows forty inches apart, and three feet apart in the row. The plantation is now fifteen years old and many of the trees are missing from the rows. Of those which are left the very best and most favored are large enough for posts. The writer measured the base circumference, and calculated the height of three of the best trees, and averaged the results: circumference $24\frac{1}{2}$ inches, height 25 feet. One of these trees stood on the outside row where the more vigorous growth was quite easily contrasted with that of the starved trees in the central part of the plantation. The owner informed me that he intended cutting some posts from this plantation in the near future. If he had planted his trees as our experiment station specialists are now advising us, he might have been cutting posts five or six years ago.

In contrast with this there is a plantation of the genuine *C. speciosa* near Xenia, which is now estimated to be worth \$600 per acre for posts and telephone poles. It was planted at proper

distances and the trees received intelligent care in pruning and early cultivation.

Perhaps the best specimen of *Catalpa speciosa* to be found in this state are now growing on the farm of Mr. Adam G. Innis, three miles northeast from the state house in Columbus, on the road to Westerville. A single row of these trees was planted inside the roadside fence twenty-five years ago. Five years later cattle had trampled down a portion of the trees and it was decided to cut them all to the ground and allow one sprout from each stump to remain. The result was a row of fine, straight, tall trees, the first branches of which though small still persist about eight or nine feet above the ground. Each year's growth can be read in the branches of each tree. The measurement of a portion of the row places the average circumference of the trunks at one foot from the ground at forty-one inches; estimated height thirty-five feet. Single specimens considerably exceed the average as the *Catalpa* is no exception to nature's great law of variation. Here is good material for telephone poles. It is quite probable that good fence posts could be produced in half the time these trees have been growing. This single row of trees planted seven feet apart has a better chance for growth than those in any plantation, but it seems to indicate the possibilities of the hardy *Catalpa*, to some extent.

During the last three years the Ohio Experiment Station has taken up the investigation of tree plantations in Ohio and is prepared to give advice to those who wish to set plantations of *Catalpa*, locust and other trees suitable for post material.

In 1904 a bulletin was issued on the subject, "The Hardy *Catalpa* as a Farm Crop." At present writing the *catalpa*

and locust plantations of the state are being carefully examined in order to present the facts regarding the conditions of such plantations in the form of a bulletin.

On the main farm at Wooster the Station is conducting experiments in order to study the growth of *catalpa*, locust, osage orange, and ash trees. In co-operation with the Agricultural Students' Union the Station last year planted one hundred and sixty acres of *catalpa*, locust and other trees on two hundred and seventeen different farms in seventy-two different counties of Ohio. The ready response to the help proffered indicates a keen interest in the work. The entomologist of the Ohio Station has promised to make some investigations concerning the locust tree's worst enemy, the borer.

The present indications are that the young farmer who is willing to wait a few years for returns from his planting, and is willing to follow the directions of our Experiment Station specialists, can grow post material at a profit, and begin immediately to plant his trees. There are other motives for tree-planting in this state but planting for profit will probably be the one which will induce the general effort. Along with the pecuniary advantages will come the climatic benefit which we are now wishing might be no further lessened.

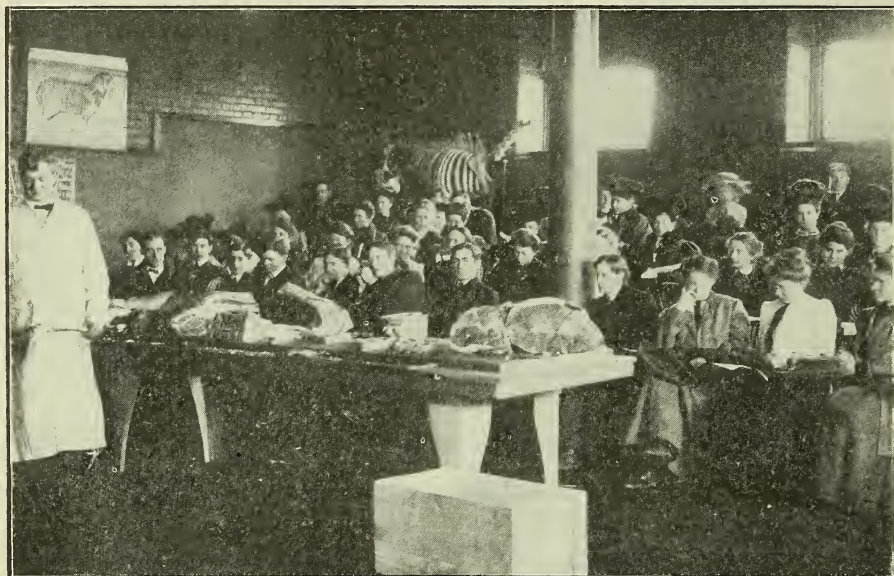
An effort is being made in Oklahoma to encourage the production of good stock. It is proposed that "all pure-bred live stock which has been exhibited at any live stock association meeting or farmers' institute, and which has been designated by qualified judges as animals of superior merit, shall be exempt from taxation for one year."

AN EXHIBITION IN MEAT CUTTING.

On March 14, there was given a novel exhibition which no doubt will become an annual event at the University. It was a demonstration in meat cutting and in the preparation of the various parts of the carcass for the retail market.

Carcasses of beef, mutton, lamb and pork had been procured from the packing house, and Mr. Thomas, the meat cutter from Armour & Co.'s branch packing house of this city, had charge of the demonstration.

stock on foot to more clearly see why an animal should be well developed in those parts from which the most valuable cuts are taken, and also the amount of waste or practically valueless parts which the producer should ever strive to correct. It gave an opportunity for observing the different texture and quality of the meat of the four classes of carcasses exhibited and of comparing the same in the different cuts of the same carcass. It was interesting to note from what parts of the



Mr. Thomas took up each carcass in detail, showing how each was divided into its parts and then how these separate parts were prepared for selling in the meat market. He took up also a discussion of the comparative value and desirability of the various cuts in each carcass and told to what uses each might be put and the ones to which each was best adapted.

The demonstration was a valuable one for various reasons. It aided the students who had had practice in judging

carcass the various cuts are taken as we find them on the market and why they are so named.

The demonstration was given under the direction of Professor Plumb for the benefit of the class in "Live Stock Markets and Commerce," while by special invitation the young ladies of the Domestic Science Department with Professor Minnie A. Stoner, and about forty other ladies, wives of the faculty, were in attendance.

INFLUENCE OF INSECT PESTS ON AGRICULTURE.

E. C. COTTON.

The serious depredations of insect pests are not generally looked upon by the average farmer or fruit grower as blessings in disguise, but as such they must be regarded.

When, about 1860, the Colorado potato beetle changed his food habits from the wild horse nettle to the more succulent potato, and left his native haunts, on the Colorado plateau and advanced across the country, the cry was raised, "the potato industry is ruined," "farmers can no longer raise this crop, in any region, in which this beetle has obtained a foothold." History far from verifying this prediction gives us a very different verdict. Instead of being destroyed the industry is stronger today than ever before and this crop is as sure of profitable returns as any that the farmer can raise. The potato beetle is still with us and probably always will be, but we have learned how to avoid serious injury to our crop from this source and much of the improvement, which we have been forced to make, in cultural methods and care of the physical condition of the plants may be charged to the influence of this insect.

The same is true of nearly every important insect pest that has found a home in this country. The codling moth, San Jose Scale and the cotton-boll weevil are making wonderful changes in our agricultural and horticultural methods. And it can be safely said that every change which we are forced to make in our cultural methods and care of the various crops affected is a distinct step in advance.

In the case of the codling moth we have an insect that has done a great deal to revolutionize the apple growing in-

dustry. Until this pest became serious enough to attract attention little or no spraying was done, in fact there was practically no machinery for that purpose. When the pest invaded the commercial apple regions it immediately commanded attention. With the commercial grower the problem became one of income, and accordingly the question arose as to which should yield, the apple industry or the insect.

The orchardist called upon the entomologists of the Experiment Stations for information as to how best to combat the foe. The entomologist began the study of the insect as it existed in the orchards and of methods for its control. It was found that two or three sprayings with an arsenical compound, intelligently applied, would prevent injury by this insect. In order to spray the trees effectively and economically the fruit grower was compelled to prune his trees more thoroughly than had been his custom. This allowed the sun and air to get into the tree and helped to increase the yield and especially the quality of the fruit.

Probably the most striking example of the effect of an insect pest on horticulture is seen in the San Jose Scale outbreak in this state. Until the advent of this pest in Ohio, about 1894, little attention had been given to the spraying of fruit trees, except by a few commercial growers. Nearly every farm had its family orchard containing a generous assortment of fruit trees of various kinds. The larger portion of the labor expended upon these trees was applied to the harvesting of the crop. In some instances the trunks and main branches were whitewashed or washed with a lye or soap so-

lution, but more often not. If the orchard happened to be located in the garden the trees were cultivated, but generally this was not continued long as it is no easy task to cultivate an orchard, so the garden was planted elsewhere and the orchard seeded to grass.

Many of these family orchards are being destroyed today by their owners, as the trees are too large to spray economically, and while the San Jose Scale will not often seriously injure the old trees themselves, it will render the fruit unsalable and unfit for use. It will also effectively prevent the profitable growth of young trees anywhere near them, as the scale will breed upon these larger trees and spread to the younger ones either destroying them or weakening them seriously unless they are thoroughly treated every year.

In the fact that this pest destroys the tree itself the problem becomes different from that involved in the control of the codling moth and other insects that attack the fruit alone, because in the latter case there is occasionally a year unfavorable to the insects and a good crop of fruit may be produced.

The effect of all this is to destroy many of the small family orchards as not many farmers feel that they can afford to buy an expensive outfit for a few trees, and nothing will, so quickly, lead a man to declare that "spraying don't pay" as a poor or cheap outfit. The careless commercial grower will also be driven out of the business, as in fighting the San Jose Scale the price of success is intelligent, painstaking thoroughness. This will place the production of a larger part of the fruit in the hands of the specialist who can afford to purchase improved machinery for spraying and who will use up-to-date methods. To those of us

whose memories of the family orchard are pleasurable this is not a pleasant thought, but it is one to which we must become accustomed. It is only another way of stating nature's inexorable law of the "survival of the fittest."

The great good which the cotton boll weevil brings to the cotton farmers of the South, lies in its compelling them to diversify their agriculture. The great burden of the farmers of that section has been their one-crop system. If the crop failed there was no income for that year; if the crop was excessively large (as is the case this year), the price was low and the income was small.

While not all of the agricultural awakening of that portion of the South that has been invaded by this pest, can be charged either directly or indirectly to it, a considerable portion must be so credited. The farmers had become accustomed to growing cotton year after year and depending upon it for their income, and probably would have gone on in the same rut for years had it not been for an outside force which compelled them to change their crop. Now that diversified farming has been thrust upon the Southern farmers and they are beginning to see the possibilities of that system no one can even predict the extent of the development of the agricultural resources of that favored region.

These are but a few of the many insects that have wielded a powerful influence in changing, slowly and gradually, or abruptly, as the case may have been, the agricultural and horticultural methods of this country. It may be said that these are severe and expensive means of producing needed changes, but, in their favor, it must be said that they are effective and always result in a distinct step toward a better agriculture.

FLAXSEED AND ITS DERIVATIVES.

E. C. RICHEY.

The flaxseed of commerce is the ripened fruit of the well known and widely distributed flax plant, which probably originated in southern Europe, although like many other important cereals which were known throughout the ancient seats of civilization, its place of origin cannot be definitely determined.

Flax is an annual of quick growth, and grows under favorable circumstances to a height of from two to three feet. The stalk is a woody pithy cylinder which is enclosed in a bark consisting of long fibers of almost pure bast. Outside of this fiber and adhering very closely to it, is an outer coarser covering. The fine inner bast fibers when separated from the outer layer and the glue which cements them together, are used in the manufacture of linen.

The terminal flowers are about one inch in diameter, and are of a pale blue color. The petals fall very soon after the flowers bloom and the seed heads or "bolls" develop very rapidly. These "bolls" are almost globular in shape, and are divided into ten cells, each one of which contains a flat oval reddish brown seed. These seeds yield several different compounds, but the most important is linseed oil and its by product, linseed or oil meal.

The flax plant will grow upon any fairly good soil, but thrives best in a loamy, sandy soil which has a sufficient amount of moisture early in the spring. In Ohio about three pecks of seed are sown per acre, which amount is sufficient to give a yield of from ten to fifteen bushels of seed and from one to two tons of straw per acre. A bushel of flaxseed will yield about eighteen pounds of

oil and forty pounds of oil meal; therefore an acre would produce about two hundred and twenty-five pounds of oil and six hundred pounds of oil meal.

In the manufacture of linseed oil there are two processes in common use, these are the hydraulic process, which is most commonly used, and the chemical or naphtha process.

The distinguishing feature of the old process is the hydraulic press. These presses are massive pieces of machinery, constructed to hold from sixteen to twenty-six cakes of flaxseed. They are arranged in rows of six, each row being presided over by three workmen.

Before the flaxseed is placed in these presses it is crushed between high speed steel rollers into a fine meal. This meal is then heated, either by injecting steam directly into it as it comes from the crusher, or by steam jacketed heaters in which the steam is not allowed to come in contact with the meal. As soon as the meal is sufficiently heated it is placed in presses or cake formers, where it is pressed into cakes of sufficient firmness to allow of their being folded in woolen clothes and placed in the hydraulic press. When the cakes have been under pressure for about one hour, they are removed and the presses refilled. The oil is then forced through filter presses in order to remove all mucilaginous substances which are known as "foots." After this purifying process is completed it is placed on the market as raw oil.

The new process is a chemical one, the oil being extracted by the use of volatile naphtha, which has a great affinity for the oil. The flaxseed after being crushed as in the old process is placed in

large iron tanks called percolators, which have a capacity of about one thousand bushels. The meal is then flooded with naphtha until the oil is all extracted, after which the solution is drawn off into evaporators. Here the naphtha is evaporated and condensed for future use, leaving the oil in the tanks.

Linseed oil has a sphere of economic usefulness peculiarly its own. It has no uses as an illuminating oil and none as a lubricant. It possesses none of the properties of the common oils, whether animal or vegetable, but is an exceptionally good drying oil. For this reason it is used very extensively in all kinds of paints, where it is compounded with different pigments and various gums. Linseed oil is used in the manufacture of linoleum, oil cloth, oil silk, patent leather and printers' ink. It is also used in the manufacture of a soap which is very useful in washing woodwork.

The only very important by product from the manufacture of linseed oil is oil cake, or (when pulverized) oil meal. The meal secured from the new process is never in the form of cakes but is always in a finely divided condition. The cakes can be secured just as taken from the presses or they may be purchased already ground. When facilities can be secured for the proper pulverizing of the cakes it is best to buy the medium or large size, as this gives no chance for adulteration.

The composition of oil meal varies according to the thoroughness with which the oil has been extracted. If the new process is employed the meal will contain a very small per cent. of ether extract. In other respects, however, the composition of the old and new process meal will be much the same.

The following table will show the composition of oil meal, as shown by a large number of analyses:

	Water.	Ash.	Protein.	Crude Fiber.	Nitrogen Free Extract	Ether Extract.
Old Process	9.2	5.7	32.9	8.9	35.4	7.9
New Process	10.1	5.8	32.2	9.5	38.4	3.

It is largely used as a stock food both in this country and abroad; however, its use is more extensive in the old country than in this. It seems that many of our dairymen and feeders are just awakening to the fact that it is a very valuable stock food. The above table will show that it is very rich in protein and it is for this constituent that it is so extensively used. Linseed meal is not usually fed alone, but is used in combination with some other grain, such as corn or oats. When fed to animals in moderate quantities it gives a quality and finish to skin and hair as is obtained by no other food.

The Colorado Experiment Station has recently purchased additional land to extend its farm facilities and to use for the horse breeding experiment to be carried on with the co-operation of the United States Department of Agriculture. The short course in agriculture has proved successful, over one hundred students being in attendance. It lasted two weeks.

On March 4, Dr. A. S. Alexander and Professor G. C. Humphrey took seventy-six agricultural students from the University of Wisconsin on a practice judging tour, which included in its course the swine breeding establishment of A. J. Lovejoy & Son, Roscoe, Illinois, and the horse importing establishment of Galbraith & Son, Janesville, Wisconsin.

CHICAGO UNION STOCK YARDS.

BAYLISS GRIFFIN.

The City of Chicago is ideally located as a receiving and distributing point for the live stock products of the United States. It has the great producing west on the one hand and the consuming east on the other. It has unexcelled shipping facilities both by water and by rail and also has an immense manufacturing and consuming population of its own. It is the natural trading point where buyers and sellers meet in greatest numbers. These advantages have made Chicago the greatest live stock market in the world. The place at which this immense business is carried on is at the Chicago Union Stock Yards, located on Halstead street, extending from Thirty-ninth to Forty-seventh streets.

The first stock yards erected in Chicago were put into operation in 1836. They were very small but were ample for the accommodation of the trade at that time, when only a few animals were driven in at a time from the surrounding prairie. Only enough stock was brought in to supply the local demand. After this as the railroads began the handling of both live and dead meats numerous yards were built at different parts of the city to meet the requirements of the increasing trade. There were also a few small slaughter houses located near these yards but they did scarcely more than a local business.

The first regular cattle market was opened in 1848 and was known as the Bull's Head Stock Yards. At this time Chicago had a population of only 20,000 but was growing rapidly.

In 1856, what had been up to this time the boldest venture in this direction, was the opening of the Myrick yards, with a capacity of 5000 cattle and 30,000 hogs.

This was considered something wonderful.

The opening of new yards in different sections of the city and the addition to the old ones was continued as the trade grew. These yards were scattered over the city and had no rapid and efficient means of communication and the condition of affairs was very unsatisfactory to both sellers and buyers in the market. The three or four yards that existed were located at considerable distances from each other; they were supplied by different railroads and from different sources, and as a brisk day at one yard might be, and frequently was, a dull day at another no uniformity could be obtained in the matter of prices. There was often a difference from 25 to 50 cents per hundred in the same class of hogs at the different yards at the same hour of the day. A dealer, therefore, if he confined his operations to any one particular yard might be giving more or getting less—as the case might be—for stock than the prices that prevailed at the other yards. This caused much confusion and trouble in the market and incurred the expense of driving stock from one yard to another in search of the highest price and was altogether very unsatisfactory. It also necessitated a great deal of extra switching and moving of cars on the railroads; consequently all parties interested were desirous of a centralizing of the trade and a union of all the yards into one.

With this end in view the Burlington & Quincy and the Northwestern railroads, together with the Hon. J. C. Dore and a few other capitalists, projected a system of stock yards outside and west of the city limits. They were called the Burlington & Western Union Drovers'

Yards and were opened in April, 1865. The enterprise was pushed with considerable energy but soon proved to be a failure. The yards were situated too far from the city, in an inconvenient direction and were almost inaccessible for shipping purposes. After an existence of three months the yards were torn down and the materials sold to the present Union Stock Yards Co.

The prospectus for this company was issued in the fall of 1864 and was followed by the immediate subscription of stock to the amount of one million dollars, \$925,000 of which was subscribed by nine railway companies having lines entering Chicago. The site chosen for the location of the yards was south of Thirty-ninth street, between Center avenue and Halstead. Three hundred and twenty acres were purchased. The land was considered an almost valueless marsh, impossible to drain. On the first of June, 1865, ground was broken and the work of construction vigorously commenced. On the twenty-fifth of December of the same year the yards were completed and opened for business, and on that day died all the old stock yards of Chicago.

Extensive and admirable in every particular, with a large and handsome brick hotel, a commodious exchange building, conveniently constructed scale houses, and a perfect arrangement of pens of every approved description, the Union Stock Yards commenced business with a certainty of commanding success. They connected with special tracks of their own with every railroad entering Chicago, so that stock could be received or shipped by or to any line at all times with the greatest dispatch.

When the yards opened for business about 120 acres were covered with pens erected at a cost of \$1,675,000. The yards contained 21 miles of railway, 10

miles of streets and alleys, over 2000 pens for cattle, 1000 covered pens for hogs and sheep and 350 stalls for horses. They had a capacity of 27,000 cattle, 100,000 hogs and 50,000 sheep. A post-office, telegraph office and a reliable bank were established at the yards for the convenience of the stock dealer. The total number of animals handled in 1866, the first year, was 1,563,693 head.

As the business grew new pens and other improvements were added, the yards and alleys paved and a sales barn for pure bred stock was erected in '86 on the site of old Dexter Park, which was one of the best known trotting tracks in the world at the time. On September 21, 1899, Dexter Park Pavilion, as the building was called, was totally destroyed by fire. It was immediately rebuilt as it stands today, being nearly one-eighth of a mile long and having accommodations for 450 cattle or horses. It also contains an amphitheatre with a seating capacity of 3500.

The yards now cover 600 acres of land, 575 acres of which are covered with plank or brick pavement. There are are 13,000 pens, 8500 of which are covered for the housing of sheep and hogs. The yards contain 25 miles of streets, 300 miles of railroad and have a capacity of 75,000 cattle, 300,000 hogs, 125,000 sheep and 6000 horses, and employs 2500 men in caring for this stock and managing the business of the company. The largest and latest improved sheep dipping pool in the world is in operation here under control of government inspectors and has a capacity for dipping 12,000 head per day.

There is no place in Chicago which compares in the amount of business done with that transacted at the yards from 5 o'clock in the morning until 3 o'clock in the afternoon. Everything is so well systematized that this enormous volume

of business is conducted with a celerity that is wonderful. The promptness and certainty with which sales are conducted and remittances made to shippers on the day of sale are unequalled in any other business. Shipments are now being made to nearly every country on the globe. Direct wires for telegraph and telephone service connect the Chicago

Yards with all prominent cities. All railroads, twenty-two in number, entering Chicago are connected directly with the yards by the Chicago Junction Railway, which is owned and operated by the Stock Yards Co. The total receipts of animals for 1903 were 15,713,515 and the total receipts for the yards up to 1904 were 426,281,122.

SUGAR BEET INDUSTRY IN NORTHERN OHIO.

GEORGE R. HYSLOP.

Several years ago, the Department of Agriculture sent out samples of seed of the sugar beet. This seed was planted, the resulting beets were tested, and it was found that in Northern Ohio there existed a large section of land well adapted to its culture.

At present one factory in this state is producing beet sugar. This factory was built at Fremont in 1899 by the Continental Sugar Company and has a daily capacity of 350 tons of beets. Owing to a difficulty in procuring the necessary acreage, they have never been pushed to their limit; their sugar campaigns have been comparatively short; and their output of sugar is not as large as it might be under more favorable circumstances.

In 1903, two thousand acres were harvested and sold at the Fremont factory. The average yield per acre for that year was 8.539 tons. Their entire sugar output was 2045.7 tons. Last year their sugar product amounted to 2009 tons. The acreage of this factory is gradually increasing as the farmers are becoming better acquainted with the possibilities of the crop. Not all sugar beets raised in Ohio are worked up at the Ohio factory; a great number

of the beets raised in the northwestern part of the state are shipped to Kalamazoo, Bay City and other Michigan points.

To secure the best results, beets must be attended to at just the right time and since much of the work about them is done by hand, a large number of laborers must be secured for such times as blocking out, thinning, hoeing, digging and topping. The large amount of hand labor and hiring of so many laborers is a little hard for the corn farmer to become accustomed to. However, he is gradually taking hold and larger acreages are being contracted for each year.

In these contracts with the Continental Sugar Company, the farmer agrees to sow, care for, harvest and deliver a certain number of acres of beets and for these he is to receive \$4.50 per ton for beets testing 12% of sugar with a purity coefficient of 80%. In addition he receives 33 1-3 cents extra for every percent over 12 and must submit to a corresponding dockage should his crop fall below 12%.

The average price per ton in 1903 was \$5.51. In 1904 the beets tested high,

many containing as much as 18% of sugar.

In the culture of the sugar beet, the first thing necessary is a good seed bed. It must be smooth and as free from dead furrows and other depressions as possible, in order to secure an even stand.

The seed is imported from Germany by the company and is sold to the farmers at 15c a pound. Fifteen pounds per acre are usually sown, with a four row drill which makes the rows 20 inches apart. The seed may be sown from the middle of April until in June. About the time the fourth leaf appears, they should be blocked out and thinned. The blocking out is done by men and boys using five to seven or eight inch hoes. They cut through the row with these hoes, then leave a bunch about two inches long and then cut through again. Small boys and girls then thin these bunches to a single beet. It is absolutely essential that they be thinned about the time the fourth leaf appears for they soon become twisted around each other and, aside from being harder to thin, develop into ill shaped beets.

After thinning they grow very rapidly and need cultivation and hoeing, a number of times. The farming is done with a horse cultivator which takes either two or four rows at a time. Along in the late summer, the company's representatives take samples and test them and if they are mature enough, harvesting begins.

A lifter is run under the beets and men following it throw them into piles. Men, women and children here take knives and cut off the tops of the beets. They must be so topped that all the leaf scars are cut off, as that part of the beet contains a large percentage of salts that prevent the crystallization of a part of

the sugar. The topped beets are now picked up with beet forks and thrown into wagons and either hauled direct to the factory or to some shipping point. Here they are tared by a representative of the company. He fills a basket from each load and weighs it. Then he scrapes off the dirt that sticks to the beets and retops all that are improperly topped and then weighs the cleaned beets. From this the percentage of dockage for the whole load is determined. A sample of each man's beets is sent to the factory, each day that he hauls, to be tested for the sugar content.

As stated before, the industry is growing and in time Ohio may become a great sugar producing state. Quite a number of towns, realizing that beets are a profitable crop and that they are an almost certain crop, have made attempts to get factories to locate in them, for, aside from their value as a crop they are especially valuable in the community in that they furnish profitable employment to a large number of people.

The Trip to Washington C. H.

Prof. C. S. Plumb, accompanied by a number of his students, on March 4, visited the farms of Messrs. Jones and Garringer near Washington C. H., O.

The forenoon was spent on Mr. Jones' farm, who is feeding at present some twelve hundred Hereford cattle. These cattle, averaging eight months old, were bought on western Texas ranches, arriving here about the middle of November. They were put into the barns on December first, where they will be kept until spring pasture comes. The feed is cotton seed meal, ensilage and alfalfa or

oat hay as a substitute. On this ration they are growing on an average nearly two pounds per day. Mr. Jones expects to market a part of them in the spring as stockers and the remaining ones during next November.

The farm consists of 2100 acres of rich loamy soil. Last season 650 acres of corn and 150 acres of soy beans (excluding ensilage corn) were raised. To the writer it was quite a novelty to see 14,000 bushels of corn on one farm.

The cattle barns are large and spacious, one being 160 feet in diameter, with an open 60-foot court in the center. The entire floor, drinking troughs, supply tanks and silos are made of concrete. The second barn is 192 x 120 feet and has the same conveniences as the first. One of the largest silos in the world is located on this farm, being 52 feet high and 40 feet in diameter.

The afternoon was spent on the farm of Mr. Garringer, who is a breeder of pure blood Aberdeen-Angus cattle. A number of very beautiful types of these animals were shown by our host. After discussing feeding methods and other relative subjects the party started homeward. Every one enjoyed themselves and were very much profited by this interesting and instructive day's visit.

W. C. Stubbs, who has been since 1885 professor of agriculture in the Louisiana State University and director of the Experiment Station, has voluntarily retired. He is succeeded by Professor W. R. Dodson, who becomes, by virtue of his office as professor of agriculture at the university, director of the three stations in the state, director of the State Geological Survey and official chemist.

University Notes.

A local branch of the Ohio State Grange was organized at the university some time ago, the membership being confined largely to professors and attaches of the university. The membership of the organization is between thirty and forty.

* * *

The Agricultural Society was addressed on March 1 by Mr. L. P. Bailey, of Tacoma, Ohio. Mr. Bailey is a member of the State Board of Agriculture and a practical dairyman. His subject was "Dairying as a Business." Following the address came the annual election of the society. After a warmly contested campaign, R. C. E. Wallace, '06, Wooster, was elected president; I. S. Cook, '06, Chillicothe, vice president, and Clarence Hengst, '07, Lancaster, secretary-treasurer.

* * *

The call has been issued for Baseball candidates. Some forty candidates for the team have already responded and it is known that there are still a number of experienced men in the school that have not as yet presented themselves as candidates for positions. The pitching staff is very strong, while the position of catcher will probably be warmly contested. Of the other positions third base and the outfield positions are left vacant from the loss of the men who held them last year.

* * *

On Friday, March 10, Ohio State's debating team met and defeated the team from Western Reserve. Western Reserve supported the affirmative, Ohio State the negative of the question, "Resolved, that the present tendency of the United States to rapidly increase its navy should be continued." Western Reserve ably supported their side of the question, having their arguments well

arranged and effectively delivered. They were only defeated by the untiring work and great effort made by Ohio State's representatives. The men representing Ohio State were T. F. Sherman, Jas. K. Kewley and J. L. Downing.

The debate was well attended, showing an increasing interest in this form of contest when compared with those of previous years.

* * *

At the class meeting held on March 8, it was decided that the members of the Senior class would wear caps and gowns during the entire month of June, and that the faculty would be requested to adopt the formality during commencement week.

* * *

Ohio State has cleared her title to state championship by defeating Reserve and Denison and having been defeated by only one team in the Big Six, that one being Oberlin, which in turn has been defeated by three Ohio teams, two of which are Big Six teams. The scores made by Ohio State since our last issue are:

March 4—Indiana 12, Ohio State 66.

March 10—Western Reserve 13, Ohio State 58.

March 18—Denison 17, Ohio State 36.

The Denison game completed the schedule of thirteen games, of which only two were lost. Between the halves of the Denison game "Tommy" Foster, a Junior in the Agricultural College, was elected captain of next year's team.

* * *

On March 18, Ohio State's track team met and defeated the Oberlin team by the score of 52 to 33. Oberlin's team has always been a "hoo-doo" to Ohio State in track athletics, and this victory consequently was a very joyous one for

Ohio State rooters. Too much credit can not be given to Coach Sweetland for his untiring efforts in developing all lines of athletics at O. S. U. The great success of Ohio's teams during the past winter and fall and the bright outlook for the future is entirely to his credit.

* * *

Dr. H. J. Webber, of Washington, D. C., spoke to the Agricultural Society on March 16. His subject was, "Some Phases of Agricultural Education." He is an extremely interesting speaker and his address was greatly enjoyed by all present.

Alumni Notes.

A. H. Snyder, '01, of the Department of Agriculture, is at present at Wooster helping with the co-operative work in soil fertility.

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C. N. Mooney, '00, has been stationed in Texas this winter.

* * *

E. O. Fippin, '00, is at Cornell taking post-graduate work in agriculture.

* * *

T. S. Johnson, '99, is professor in agriculture in the Texas College of Agriculture and Mechanical Arts, at College Station, Texas.

* * *

D. H. Givens, '99, who is engaged in the lumber business at Culver, Minn., reports that business is good and that he is prospering.

* * *

W. T. Florence, ex-'06, who has been working in the south during the past winter, has returned to his home at Plain City, where he expects to take up general farming.

* * *

C. A. Clawson, '00, has been calling upon old friends in the city for the past few days.

* * *

Albert F. Conradi, '01, is acting entomologist of Texas Agricultural and Me-

chanical College, College Station, Texas.

* * *

J. C. Britton, '98, is at present in the Division of Soil Management, Bureau of Soils, being temporarily located at Takoma Park, a suburb of Washington, D. C. During the coming summer he will travel through the south.

* * *

Jesse E. Chance, ex-'06, is with the Automatic Telephone Company of Chicago. He has been having very good success. For the benefit of his friends we give his address, 1622 Grace street, Chicago, Illinois.

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Chas. P. Fox, B. Agr., '90, and M. Agr., '95, is at present residing at 395 Doyle street, Akron, Ohio. He is crude rubber expert of the Diamond Rubber Company, and is devoting special study to rubber producing plants of north temperate zone.

* * *

Wm. Crawford, special student in botany, 87-'88, is engaged in newspaper work in Chicago.

* * *

Eugene Cranz, one of the first short-course men, being here in '84 and '85, is a successful farmer at Ira, Ohio. He was the Democratic candidate for the legislature in 1904 and although defeated ran far ahead of his ticket.

Dairy Notes.

The Wisconsin Buttermakers' Convention held at Fond du Lac, February 21-23 was a very interesting meeting. Many buttermakers were in attendance and the discussions were hard to shut off on account of the keen interest manifested. The majority of those in attendance were graduates of the Wisconsin dairy school and they were prepared to discuss subjects and ask questions from an advanced standpoint not usually seen in such a meeting. It was a good illustration of what the dairy school is doing for the state. One hundred and twenty-four tubs of butter were entered in competition for the pro rata premium of over

\$1000. The butter was scored by Mr. P. H. Kieffer, of Manchester, Iowa, an expert on flavor, body and color. Samples of butter from the Ohio Dairy School scored 92½ and 93. Mr. Kieffer pronounced the workmanship O. K. but the milk from which it was made several days old, which was the case.

The exhibit butter was sold to A. H. Barber of Chicago for 34 cents a pound and netted \$824.

The citizens of Fond du Lac subscribed \$472 as a convention fund. A large hall was filled with exhibits of machinery and dairy supplies.

The special dairy class of 1905 has finished its labors and dispersed. T. L. Bates, W. C. Cline, F. P. Mills, and Maynard Wolcott have completed the two terms required for a dairy certificate.

Eleven members of the class will work on dairy forms, nine will work in creameries and seven are considering offers. Next month a list of students with their occupations will be given.

On Thursday evening the class assembled in the creamery laboratory for a spread. It was a most enjoyable affair. A dairy lunch was served. Several toasts were responded to. A dairy stunt, representing a very amusing milking scene, was presented by several members of the class, and just before eleven o'clock after swapping yarns the gathering broke up with the O. S. U. yell. The class of '05 beats all previous classes in class spirit and earnest work.

Book Reviews.

SUCCESSFUL FRUIT CULTURE—A practical guide to the cultivation and propagation of fruits, by Samuel T. Maynard, formerly Professor of Horticulture at the Massachusetts Agricultural College. Illustrated, 5x7 inches, 265 pages, cloth. Price, postpaid, \$1. Orange Judd Company, New York.

This book is written from the standpoint of the practical fruit grower, who

is striving to make his business profitable by growing the best fruit possible at the least cost. It is up-to-date in every particular, and covers the entire practice of fruit culture. It gives in plain, practical language, descriptions of such varieties as are most in demand in our markets, and the methods practiced by the most successful cultivators of many sections of the country. The chapter on the apple is particularly comprehensive and complete, forming a monograph in itself. It treats very fully on the soil best suited to its growth, trees for an orchard, digging the holes, preparing the trees for planting, establishing the head, time for planting, turf culture, green manuring or cover crops, mulching, pruning, thinning fruit, age of bearing, regrafting old trees, varieties, gathering apples, assorting apples, packages and packing, marketing apples, storing apples, cold storage houses, etc., etc. With like thoroughness the other kinds of fruits are discussed.

The chapter on forcing peaches, grapes, strawberries and other fruits describes the most modern and successful methods of the present day, and is the most recent practical treatise on this important industry.

A New Book on Grasses.

FARM GRASSES OF THE UNITED STATES
—By W. J. Spillman, Agrostologist
United States Department of Agriculture. Illustrated. 5x7 inches, 248 pages, cloth. Orange Judd Company. Price, postpaid, \$1.

Professor Spillman has given us in this volume an intensely practical discussion of the farm grasses of the United States of America. The book is essentially a resume of the experience of farmers in the United States with grasses. When we consider the broad field encompassed it is safe to say that no other work on grasses has covered the ground

so thoroughly. The whole subject is considered entirely from the standpoint of the farmer. One of the most valuable features of the book is the maps showing at a glance the distribution of every important grass in the United States; and the reasons for the peculiarities in this distribution are fully brought out.

This book represents the judgment of a farmer of long experience and wide observations regarding the place in agriculture of every grass of any importance in American farming. In its preparation its use as a textbook in schools, as well as a manual of reference for the actual farmer, has constantly been kept in mind. The book is most conveniently arrayed and splendidly indexed, so that the reader may find any subject at a glance.



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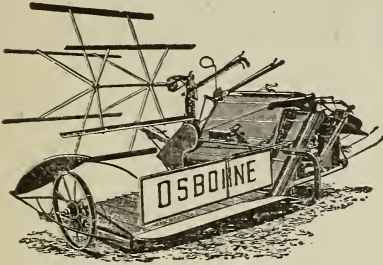
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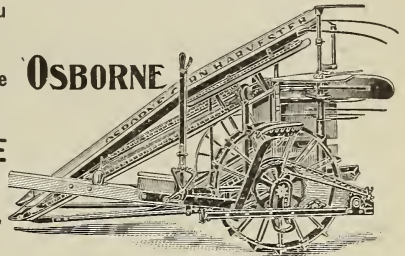
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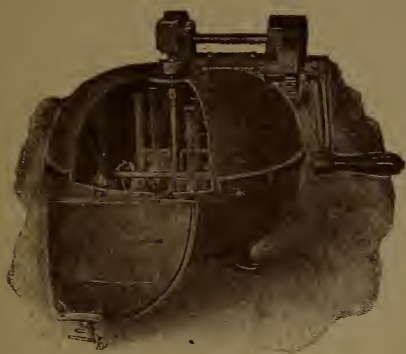
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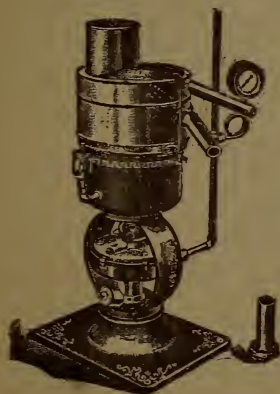


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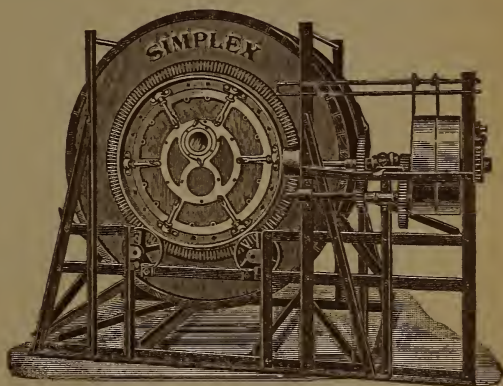
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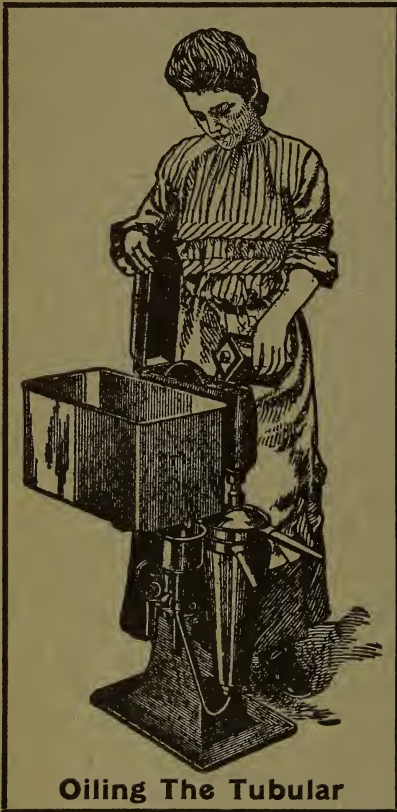
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